14

PATENT
Docket No. 146712001400

CERTIFICATE OF HAND DELIVERY

I hereby certify that this correspondence is being hand filed with the United States Patent and Trademark Office in Washington, D.C. on February 11, 2003.

Stephanie R. Mason

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In the application of:

Samuel D. HARKNESS, IV et al

Serial No.: 09/781,978

Filing Date: February 14, 2001

For: POST-DEPOSITION ANNEALED RECORDING MEDIA AND METHOD OF MANUFACTURING THE SAME

Examiner: Bernard D. Pianalto

Group Art Unit: 1762

APPELLANT'S OPENING BRIEF

Commissioner for Patents
Washington, D.C. 20231

Sir:

This is a timely appeal from the final rejection of claims 10-19 of this application.

I. REAL PARTY IN INTEREST

The real party in interest is Seagate Technology Holdings (formerly Seagate Technology LLC).

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences within the meaning of 37 CFR 1.192(c)(2) known to appellant or counsel.

III. STATUS OF CLAIMS

Claims 10-19 (shown in Appendix 1), which are under final rejection, are the only pending claims in the application.

(a) Claim Rejections - 35 USC 102: (1) Claims 10, 11 and 13 were rejected as being anticipated by Kuo (U.S. Pat. No. 6,117,282).

(b) Claim Rejections - 35 USC 103: Claims 12 and 14-19 were rejected as being obvious over Kuo.

IV. STATUS OF AMENDMENTS

No amendment of claims has been filed and the only declaration presented in prosecution (of Dr. Samuel D. Harkness of January 10, 2003) has been entered.

V. SUMMARY OF THE INVENTION

The invention of this application is generally directed to a magnetic medium, such as a disc in a hard-drive of a computer, and the method of manufacturing the medium. [1:14-17]

The present invention enables the manufacture of a magnetic recording medium, comprising a substrate, a magnetic recording layer and a caplayer, wherein the caplayer has been annealed *in situ*. "*In situ*" annealing means that the medium was annealed during the manufacturing process without having to remove the medium from a sputtering system to a

separate location. Preferably, the *in situ* annealing is at a temperature of from about 150°C to about 550°C for a period of from about 10 seconds to about one minute. [4:9-14]

An embodiment of this invention is a method of manufacturing a magnetic recording medium, comprising depositing a magnetic recording layer on a substrate, depositing a caplayer on the magnetic recording layer and annealing the caplayer *in situ* at a temperature of from about 150°C to about 550°C. The method could further comprise depositing a layer comprising CoCrPt on the substrate prior to depositing the caplayer. The method could further comprise depositing a protective layer on the caplayer after annealing. The annealing could be carried out at from about 250°C to about 350°C. The annealing could be carried out for less than about 30 seconds. In a preferred embodiment, the annealing is carried out for about 14 seconds at a temperature of about 300°C. [4:21-5:7]

Another embodiment of the process could further comprise depositing a sub-seed layer on the substrate; depositing a seed layer on the substrate; depositing an underlayer on the seed layer and depositing a intermediate layer on the underlayer; wherein the magnetic layer is deposited on the intermediate layer. [5:8-11]

The magnetic layer could comprise at least one of Co, Cr, B, Pt, Ta, and Nb. The magnetic layer could comprise a layer of CoCrPt having a thickness of from about 100 nm to about 400 nm. [5:12-14]

According to one embodiment of the invention, the recording media of the present invention has a caplayer ranging in thickness of from about 0.5 nm to about 5.0 nm deposited on the magnetic layer of the medium by maintaining a system base pressure of $1x10^{-7}$ Torr with less than 50% partial pressure from background water and then using depositing means such as a disc sputtering system. Preferred is the Intevac MDP-250B system. To obtain a multilayer structure, the depositing means may also include a standard dc-magnetron-sputtering unit. [8:3-9]

Using the disc sputtering system in conjunction with a standard DC-Magnetron sputtering unit, a multilayer structure could be applied to a super-polished glass-ceramic substrate beginning with a NiAl-based seedlayer, a Cr-based underlayer, and a CoCrPt magnetic layer. A caplayer is applied on the magnetic layer. The caplayer ranges in thickness from 0.5 to 5 nm. [8:10-14]

The caplayer and the caplayer means should preferably have a Cr content of less than about 15 at.% and preferably comprises CrMn. Once the caplayer has been deposited on the magnetic layer, the recording medium is annealed *in situ.* The preferred means for annealing the caplayer is an infrared heater in the range of 10-20 kW installed in the medium processing sequence to permit *in situ* heating of the medium during fabrication. In a preferred embodiment, a 12 kW infrared heater is used to allow the caplayer to be subjected to 250°C-300°C for a period not to exceed 15 seconds. Preferably the caplayer has a thickness of about 0.8 nm and is annealed for 15 seconds at 300°C. [8:15-22]

In Example 1 of the specification, media samples were fabricated using an Intevac MDP-250B disc sputtering system as shown in Fig. 1 of the specification, which in this example was *both* the means for depositing on a substrate a caplayer and the means for annealing the caplayer. System base pressure (B.P.) was maintained below $1x10^{-7}$ Torr with < 50% partial pressure from background water. Standard dc-magnetron sputtering units were used in conjunction with the system to apply regular media multilayer structures generally composed of NiAl-based seedlayers, Cr-based underlayers and various magnetic layers to super-polished Ohara glass-ceramic substrates. CoCrPt, CoCrPtB, and CoPtTaB magnetic compositions were selected based on inherently high exchange coupling, wide grain boundary width, and narrow grain boundary width respectively. Deposition substrate temperature was maintained at 270°C. Crystallite sheet texture for all structure-types fabricated was confirmed to be (112) for the sublayer and (10.0) for

corresponding magnetic layers using x-ray diffraction (XRD). In addition to the standard multilayer configuration, a caplayer of CrMn was applied to the top surface of the magnetic layer. A caplayer of CrMn is applied to the magnetic layer with a thickness of 0.8 nm and annealed *in situ* with a 12 kW infrared heater at 300°C for 15 seconds. Additional samples were processed *ex-situ* using a Modular Process Technology RTP-6005 capable of reaching temperatures of 1200 °C. [10:15-11:8]

Recording parametrics were measured using a Guzik 1701MP spinstand tester and magnetic properties were determined from vibrating sample magnetometer (VSM) measurements. Microstructural data was collected from transmission electron microscopy (TEM), and XRD. [11:9-12]

Shown in Fig. 2(a) of the specification is the coercive force of the as-deposited and as-annealed samples for media having CrMn/CoCrPt/Cr/NiAl multilayer structures, with a caplayer of 0.8 nm of CrMn. The annealed sample was *in-situ* post annealed at 300 °C for 15 seconds. The data show that *in-situ annealing greatly boosts the coercive force* of the as-deposited samples, which was *totally unexpected.* [11:13-17]

VI. ISSUES PRESENTED FOR REVIEW

(1) Whether the Examiner erred in rejecting claims 10, 11 and 13 as being anticipated by Kuo.

(2) Whether the Examiner erred in rejecting claims 12 and 14-19 as being obvious over Kuo.

VII. GROUPING OF CLAIMS

Group I: Claims 11-19 stand or fall together.

VIII. ARGUMENTS

A. The Rejections of the Claims Over the Prior Art Should be Reversed.

Claims 10, 11 and 13 have been rejected as being anticipated by Kuo. Claims 12 and 14-19 are rejected as being obvious over Kuo. Claim 10 recites, "annealing the caplayer *in situ* at a temperature of from about 150°C to about 550°C." [Italics in original.] On page 4, lines 11-13, the Summary of the Invention states:

> "*In situ*" annealing means that the medium was annealed during the manufacturing process without having to remove the medium from a sputtering system to a separate location.

In the Advisory Action of January 30, 2003, the Examiner states that the term "insitu" is defined as "in the natural or original position." The Examiner does not provide a source for this definition of the term "insitu." However, the Examiner's definition of *in-situ* is clearly **not** the Applicants' definition of this term in the specification. It has been stated by the Federal Circuit that consistent with the well-established axiom in patent law that a patentee is free to be his or her own lexicographer, a patentee may use terms in a manner contrary to or inconsistent with one or more of their ordinary meanings. *Hormone Research Foundation Inc. v. Genetech Inc.*, 904 F.2d 1558, 15 USPQ2d 1039 (Fed. Cir. 1990). Therefore, it is incorrect for the Examiner to "impose" his definition of the term *in-situ* when this term is clearly defined in the specification. Applicants therefore request that the term *in-situ* should be interpreted in light of the specification and the following arguments should be considered in light of the Applicants' definition of the term *in-situ*.

Kuo does **not** disclose or suggest *in situ* annealing as Applicants have defined this term. In Kuo, the Co-Tb films are first deposited in "a conventional magnetron" (col. 4, line 37) and "then annealed in a vacuum furnace for 60 minutes" (col. 6, line 56). Persons of ordinary skill in

this art would immediately recognize that these two steps of Kuo do not constitute *in situ* annealing as the term "*in situ*" is defined in the specification.

In fact, in column 5, lines 1-6, Kuo *teaches away* from heating the substrate in the claimed *in situ* annealing temperature range during the sputtering process by stating, "if the substrate is heated above 78°C by a heating element the magnetic properties of the Co-Tb film decrease rapidly. This is due to the formation of small low magnetic property crystalline particles in the film." Thus, Kuo maintains the substrate at 25°C during the sputtering process.

In response to the Applicants arguments in the response of October 2, 2002, the Examiner states the following in the paragraph bridging pages 2 and 3 of the Action of October 11, 2002:

> Applicants argue in the 4th full paragraph on page 2 of their remarks that "Kuo does not disclose or suggest in situ annealing" and in the next full paragraph argues that "Kuo teaches away" from heating the substrate. The examiner is not convinced by these arguments since claim 1 of the reference in [sic] defines a process which encompasses for example claim 10. This claim 1 of the reference does not define a step of removing the device from the sputtering space and annealing in a separate space. Claim 1 of the reference encompasses a process such as that claimed.

Applicants respectfully submit that the Examiner has ignored the fundamental rules for determining anticipation and obviousness. "Under 35 U.S.C. § 102, anticipation requires that each and every element of the claimed invention be disclosed in a prior art reference ... ." *Akzo N.V. v. U.S. Int'l Trade Comm'n*, 808 F.2d 1471, 1 USPQ2d 1241 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987). Also, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

Nowhere does Kuo disclose "annealing the caplayer *in situ* at a temperature of from about 150°C to about 550°C" as recited in claim 10. The Examiner relies on claim 1 of Kuo for

disclosing "annealing the caplayer *in situ*." Claim 1 of Kuo states, "forming an 100Å-SiNx protected amorphous Co-Tb film with $Hc_{\perp}$ =4230 Oe by magnetron sputtering, and applying a heat treatment on the amorphous Co-Tb film ... ." However, **nowhere** does claim 1 of Kuo recite "annealing the caplayer *in situ*." When claim 1 of Kuo is interpreted in light of the specification of Kuo, it is clear that the Co-Tb films are first deposited in "a conventional magnetron" (col. 4, line 37) and "then annealed in a vacuum furnace for 60 minutes" (col. 6, line 56). Persons of ordinary skill in this art would immediately recognize that these two steps of Kuo do not constitute *in situ* annealing as the term "*in situ*" is defined in the specification. In short, Kuo fails to teach or suggest *in situ* annealing.

This fact is explained in the attached unexecuted copy of the Declaration of Dr. Samuel D. Harkness, IV, based on evidence available in Kuo itself. In the Advisory Action of January 1, 2003, the Examiner discounts Dr. Harkness' opinion as being "based primarily on personal opinion with out the benefit of a showing commensurate in scope with the claims."

"An affidavit submitted to overcome a rejection is intended to be relied upon. ... [A]rguing that an affidavit submitted to persuade was defective as presenting only opinion, not fact, and that it should be discounted, qualifies only for a chutzpah award, not a reversal." *Refac International, Ltd. v. Lotus Development Corporation*, 81 F.3d 1576; 38 USPQ2d 1665 (Fed. Cir. 1996); citations omitted. Applicants respectfully submit that Dr. Harkness' Declaration should be relied upon.

Dr. Harkness' Declaration is based on the disclosure of Kuo itself to explain what a person of ordinary skill in this art would understand by reading Kuo. Besides, Figure 2 of the specification already show the unexpected benefit of *in-situ* annealing that is completely commensurate in scope with the claims. Also, on page 3, lines 1-6, of the Amendment of October 2, 2002, Applicants stated:

> [N]ote that Kuo requires 60 minutes, ***3,600 seconds***, of annealing at 250°C when the annealing was done in a furnace (col. 6, line 67), i.e., it is was not done *in situ*. On the other hand, Applicants *unexpectedly* found that when annealing is done in situ, it could be completed in "a period not to exceed ***15 seconds***" (page 8, line 21, of the specification; emphasis added) at 250-300°C. Therefore, the Examiner should consider the *unexpected results* of this invention.

Yet, the Examiner simply failed to consider the unexpected results shown in the specification, which the Examiner is required to do in accordance with the position of the Federal Circuit in *In re Soni*, 34 USPQ 2d 1684, 1687-88 (Fed. Cir. 1995):

> Here, Soni's specification contains more than mere argument or conclusory statements; it contains specific data indicating improved properties. It also states that the improved properties provided by the claimed compositions "are much greater than would have been predicted given the difference in their molecular weights." . . .
>
> Mere improvement in properties does not always suffice to show unexpected results. In our view, however, when an applicant demonstrates substantially improved results, as Soni did here, and states that the results were unexpected, this should suffice to establish unexpected results in the absence of evidence to the contrary. Soni, who owed the PTO a duty of candor, made such a showing here. The PTO has not provided any persuasive basis to question Soni's comparative data and assertion that the demonstrated results were unexpected. Thus, we are persuaded that the Board's finding that Soni did not establish unexpected results is clearly erroneous.

Please note, "Consistent with the rule that all evidence of nonobviousness *must* be considered when assessing patentability, the PTO *must* consider comparative data in the specification in determining whether the claimed invention provides unexpected results." *Id.* (emphasis added). Similarly as in *Soni*, the Examiner has not provided any persuasive basis to question Applicants' comparative data and assertion that the demonstrated results were unexpected.

In the Advisory Action of January 30, 2003, the Examiner states "applicants' claim 10 for example encompasses for example claim 1 of the reference." The court in *In re Alul*, 468 F.2d 939, 175 USPQ 700 (CCPA 1972) stated, "The boards allegation that 'the claims encompass operating conditions described in the reference' could only be upheld by ignoring the limitation in the claims that the amount of catalyst must be 'correlated with the temperature to provide a mixture in which there is no separate liquid catalyst phase.'" Similarly, in the present case, the Examiner's allegation that "applicants' claim 10 for example encompasses for example claim 1 of the reference" could only be sustained by ignoring the meaning of *in-situ* as defined in the specification.

Furthermore, in the Advisory Action of January 30, 2003, the Examiner states, "Claim 1 of the reference also encompasses the annealing step in the deposition chamber [of the claimed invention]." The Examiner believes that claim 1 of Kuo "encompasses" some aspects of this invention, regarding which the Applicants disagree, so Kuo is an invalidating reference. According to this line of argument, there should be no improvement patents if a broad claim of a previous patent reads on the invention of the improvement patents. Clearly, this line of reasoning is incorrect as explained by Judge Rich in *In re Benno*, 768 F.2d 1340, 225 USPQ 683 (Fed. Cir. 1985):

> Samuel F. B. Morse, the inventor of the telegraph, had a patent thereon, issued in 1840, containing a claim (which the Supreme Court held invalid) which was broad enough to read on the modern Telex. See O'Reilly v. Morse, 56 U.S. 62, 112, 15 How. 62, 14 L. Ed. 601 (1853). By the board's reasoning, Morse's telegraph patent therefore would have made the Telex obvious. The scope of a patent's claims determines what infringes the patent; it is no measure of what it discloses. A patent discloses only that which it describes, whether specifically or in general terms, so as to convey intelligence to one capable of understanding.

In short, the scope of the Kuo's claims determines what infringes the Kuo patent; it is no measure of what the Kuo patent discloses.

Finally, in the Advisory Action of January 30, 2003, the Examiner states, "It is also the examiner's position that annealing in a deposition chamber would have been obvious to one having ordinary skill in this art at the time of the invention was made." The Applicants respectfully submit that the Examiner never raised this argument before and, therefore, it is tantamount to a new ground of rejection. Under a similar situation, the court in *In re Alul*, 468 F.2d 939, 175 USPQ 700 (CCPA 1972) stated:

> We note that a substantial part of the solicitor's brief is devoted to arguments which were not raised below and which are tantamount to new grounds of rejection. The practice of raising such matters at this stage of the prosecution is unfair to the other party, adds to the burden of the court, and serves to obscure the raising party's position on the issues that actually were raised below. We will not consider these new arguments.

Similarly, in the present case, the Board should not consider this new argument of the Examiner, which are purely speculative *without any* factual basis to support the new argument.

CONCLUSIONS

For the foregoing reasons, Applicants submit that the anticipating and obviousness rejections should be withdrawn.

In the event that the transmittal letter is separated from this document and the Patent and Trademark Office determines that an extension and/or other relief is required, applicants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952,** referencing docket number 146712001400.

Respectfully submitted,

Dated: February 11, 2003 By: _____

Raj S. Davé, Ph.D., J.D.
Registration No. 42,465

Morrison & Foerster LLP
1650 Tysons Boulevard,
Suite 300
McLean, Virginia 22102
Telephone: (703) 760-7755
Facsimile: (703) 760-7777

APPENDIX 1

10. A method of manufacturing a magnetic recording medium, comprising:

depositing a magnetic recording layer on a substrate,

depositing a caplayer on the magnetic recording layer and

annealing the caplayer *in situ* at a temperature of from about 150°C to about 550°C.

11. The method of claim 10, further comprising depositing a layer comprising CoCrPt on the substrate prior to depositing the caplayer.

12. The method of claim 10, further comprising depositing a protective layer on the caplayer after annealing.

13. The method of claim 10, wherein annealing is carried out at from about 250°C to about 350°C.

14. The method of claim 10, wherein the annealing is carried out for less than about 30 seconds.

15. The method of claim 10, wherein the annealing is carried out for about 14 seconds at a temperature of about 300°C.

16. The method of claim 15, wherein the caplayer has a thickness of from about 0.5 nm to about 5 nm.

17. The method of claim 10, wherein prior to depositing the caplayer on the substrate, the process further comprises:

depositing a sub-seed layer on the substrate;

depositing a seed layer on the substrate;

depositing an underlayer on the seed layer and

depositing a intermediate layer on the underlayer;

wherein the magnetic layer is deposited on the intermediate layer.

18. The method of claim 17, wherein the magnetic layer comprises at least one of Co, Cr, B, Pt, Ta, and Nb.

19. The method of claim 18, wherein the magnetic layer comprises a layer of CoCrPt having a thickness of from about 100 nm to about 400 nm.